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# **Appendix C**

Cinergy Bullard Project  
Substation Work Scope

## **Preliminary Substation Job Scope For Preliminary Cost Estimate**

### **Cinergy Bullard Energy Center Project**

#### **Notes:**

- 1. This scope is preliminary and is for the purposes of making preliminary cost estimates to support the interconnection study.**
- 2. This scope is based on preliminary Protection Requirements (Appendix B)**

<b>Build New PG&amp;E 230kV Switching Station</b>
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Engineer, design and build a new 230kV Switching Station to loop into the existing Herndon-Kearney 230kV line and to interconnect Cinergy's Bullard Energy Center. This new switching station will be located south of Herndon Substation and north of Kearney Substation and is assumed to be on the east side of the Herndon-Kearney 230kV Line.

The new switching station initially will have a ring bus but capable of being modified and/or expanded in the future to a BAAH (breaker-and-a-half) scheme. See accompanying outdoor layout sketch and electrical single line. The real estate required will be approximately 500 ft x 500 ft. The actual size will be determined at the time of design.

The scope for the initial construction includes but is not limited to:

#### **OUTDOOR**

Major equipment includes following:

- Three (3) 230 kV SF6 gas filled high voltage circuit breakers, each rated 2000 ACC, 40KAIC
- Six (6) 230 kV, 2000 amp, three-phase breaker disconnect switches, manually operated, each mounted horizontally upright on a low-profile steel support structure.
- One 230 kV, 2000 amp three-phase line disconnect switch mounted on a low profile switch support structure underneath a 230kV dead end/pull off structure for the new 230kV line connecting the new Bullard EC Switchyard. This 2000 amp switch serves as a line disconnect on the PG&E side.
- One 230 kV, 2000 amp three-phase line disconnect switch mounted on dead end/pull off and switch support structure for isolating the Herndon line
- One 230 kV, 2000 amp three-phase line disconnect switch mounted on dead end/pull off and switch support structure for isolating the Kearney line
- Nine (9) 230 kV CCVT's, on one-phase or three-phase steel support structures.
- One 230kV line trap for the Kearney line. One of the CCVT's on the line side will have carrier.
- Two 230kV/120-240V, 100 kVA power voltage transformers (PVT) for AC Station Service, connected one each to the 230kV bus. These PVT's will serve as sources of power for the AC Station Service.
- One extended 12kV wood pole line will be built outside the station to bring any available nearby existing PG&E distribution power as alternate source of AC station power. (This is not included in the present estimate.).
- One outdoor manual transfer switch to select between sources of power for AC Station Service.
- One (1) outdoor 120/240 VAC circuit breaker panel to power yard equipment branch circuits.

- All necessary yard lighting standards and lighting fixtures along with yard receptacle fixtures providing 120/240V one-phase power. One outdoor lighting panel will be installed for this.
- Drivable cable trenches and/or duct bank,, and pull boxes.
- A secondary containment for each of the power voltage transformer for AC station service power.
- Three (3) 230 kV H-frame dead-end/pull off structure/switch support structures for 230kV to Herndon, Kearney and Bullard EC. The ones for Herndon and Kearney will each support a line disconnect switch.
- Conduit runs from cable trenches (if applicable) and pull boxes to all above-ground equipment.
- Concrete foundations for all above-ground structures, supports and equipment.
- One main ground grid system.
- One modular MPAC building per PG&E standards and to be supplied by an PG&E-approved supplier, approx. 49ftx16ft in size, complete with indoor AC, DC panels, battery charger, lighting and HVAC, etc and containing all switchboard panels for integrated metering, protection and control.
- One separate, 20 ftx16 ft battery building containing a 125 VDC battery (At final design, this battery building may be a room only inside the MPAC building if space is available)
- Pull new control and DC wiring between 230kV HVCB's, CCVT's, and all other equipment to the MPAC
- Entrance gate or gates.
- One chain-link fence system with isolated fence ground, and with entrance gates and emergency personal gates
- Internal Roadway

#### **INDOOR:**

Install the following, in an MPAC (modular protection, automation and control) building:

- One line-up of switchboard panels for initial operation and control of three 230kV line circuits. Provision shall be made in the initial design for future expansion
- One or two (2) 125 VDC circuit breaker panels.
- 120/240 VAC circuit breaker panels
- General lighting and receptacles.
- Battery charger
- Fire detection and monitoring system.
- SCADA for substation automation
- HMI for substation automation
- SCADA RTU for station automation
- Communication hardware, including fiber optic terminal equipment for fiber links for current differential line protection.
- All instrumentation and control required

### **Herndon (Replace CB 122, 132, 142, 152) and Replace Line Relays on CB 232)**

Part of the scope at this station is to replace CB 122, 132, 142 and 152 that will be overstressed or further overstressed by this project. Since no job walkdown has taken place at this time, unit costs based on past experience on similar jobs will be used for the preliminary cost estimate.

The other part of the scope is to replace the line relays on CB 232 (the Herndon-Kearney 230kV Line). Since the two sets of relays require two separate CT signals and since the existing breaker has only one set of CT's for the line relays, it is assumed here that a set of external slip-over bushing CT's will be added instead of replacing the breaker.

The existing line protective relays and meters, etc, are located on switchboard Panels 2C and 2R. These two panels are shared with CB 242 and present a higher level of difficulty in construction.

All old relays associated with CB 232 will be removed to make room for the following new relays to be installed:

- One GE L90 Set A current differential relay as one terminal of a two-terminal Herndon-Bullard EC pilot scheme using dual fiber optic communication line.
- One SEL 311L Set B current differential relay as one terminal of a two-terminal Herndon-Bullard EC pilot scheme using dual fiber optic communication line
- One SEL 2505 I/O relay or one set of MVAJ 21 aux relays.

Wire new relay alarms to the station annunciator and SCADA

- Add GE IP server and Garrett Com switch and wire the new relays to GE IP server and Garrett Com switch as appropriate.

Since new fiber optic cable will have to be installed by Telecom, a set of two dedicated 4" PVC conduits, including two 5ftx5ftx5ft pull boxes, will need be installed for the Telecom fiber.

### **Kearney (Replace Line Relays on CB 232)**

The scope is to replace the line relays on CB 212 (the Herndon-Kearney 230kV Line). Since the two sets of relays require two separate CT signals and since the existing breaker has only one set of CT's for the line relays, a second set of internal BCT's will be installed on CB 212

The existing line protective relays and meters, etc, are located on switchboard Panels 1C and 1R and will be removed.

The following new relays will be installed:

- One GEDL90 Set A relay as one terminal of a two-terminal carrier scheme on power line carrier.
- One SEL 311C Set B relay as one terminal of a two-terminal carrier scheme on power line carrier.
- One SEL 2505 I/O relay or one set of MVAJ 21 aux relays.
- One Pulsar TCF-10B power line caarier transceiver for frequency shift keying scheme

Wire new relay alarms to the station annunciator and SCADA

- Add GE IP server and Garrett Com switch if not existing and wire the new relays to GE IP server and Garrett Com switch as appropriate.

### **Developer's 230kV Switchyard or Substation at Bullard Energy Center**

The Developer is required to meet all the applicable requirements in the PG&E Interconnection Handbook.

PG&E will review protection and revenue metering design and install meter

PG&E will provide pre-parallel inspection and witness testing

PG&E will review SCADA and EMS design and provide telecom support for EMS telemetry and SCADA

### **PG&E's ECC and SFGO TOC**

PG&E ISTS will install telecom equipment for EMS telemetry and SCADA at the SF Transmission Operating Center and at PG&E's Electrical Control Center that has jurisdiction over this project.